Final
Management Plan
Surface Water Investigation of
Lacamas Creek
Camp Bonneville
Vancouver, Washington

HARTCROWSER
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Prepared for
U.S. Army Corps of Engineers
Seattle District

Contract No. DACA67-98-D-1008
Delivery Order No. 20

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CONTENTS

TABLES

FIGURES

MANAGEMENT PLAN
SURFACE WATER INVESTIGATION OF LACAMAS CREEK
CAMP BONNEVILLE
VANCOUVER, WASHINGTON

1.0 INTRODUCTION

This Management Plan presents a description of the efforts necessary for performing a limited surface water investigation of Lacamas Creek near Landfill 4 at the Camp Bonneville Military Reservation located near Vancouver, Washington. This investigation will provide preliminary information on the potential impacts to Lacamas Creek that may have occurred from activities at Landfill 4. To provide this information, surface water samples will be collected adjacent to, upstream, and downstream from Landfill 4. This work is being performed for the United States Army Corps of Engineers (Corps) under Contract No. DACA67-98-D-1008, Delivery Order No. 20. This Management Plan is based on the Statement of Work produced by the Corps, dated September 24, 1999.

This plan should be considered an attachment to the Management Plan generated for the first surface water sampling (Hart Crowser, 1998). This attachment describes the site background, the proposed sampling activities, and the proposed work schedule for the second surface water sampling event. Since the data quality objectives (DQOs) and health and safety issues related to physical hazards and the chemicals of concern for this project are identical to the previous phase of work conducted by Hart Crowser, the existing Quality Assurance Project Plan (QAPP) and the Accident Prevention Plan (APP) (Hart Crowser ,1998) will be used for this project as referenced in this plan.

Hart Crowser will have overall responsibility for data collection, with support for specific components provided by subcontractors. Table 1 lists Hart Crowser's personnel and subcontractors with primary project involvement. Their roles, phone numbers, and brief descriptions of project responsibilities are provided in the table.

2.0 WORK PLAN

2.1 Project Objective

The objective of this investigation is to determine whether constituents of concern are migrating from Landfill 4 to Lacamas Creek. The potential for

migration into the creek via other media, including soils and surface water runoff, will be conducted as part of the planned follow-up investigation of Landfill 4. The results of the surface water investigation will be used to guide additional investigations, as necessary.

The need for remedial actions at Landfill 4 will be based on all available information, including the additional site characterization work planned for Landfill 4.

2.2 Site Background

Camp Bonneville Military Reservation is a 3,840-acre installation located near Vancouver, Washington (Figure 1) in the Lacamas Creek valley, between the western slope of the Cascade Mountains and the Portland-Vancouver Basin. The site was used as a drill field, rifle range, and training camp since 1909. Camp Bonneville has been selected for closure under the 1995 Base Realignment and Closure (BRAC) process.

The Landfill 4 area has been identified as potentially containing building demolition debris waste, military waste, and debris related to ordnance demolition activities. Previous investigations suggest the landfill area is about 2,400 square feet and extends to depths of approximately 11 feet below ground surface.

Previous investigation of Landfill 4 at Camp Bonneville (Shannon & Wilson, 1999) identified the following list of constituents of concern as detected in groundwater and/or soil samples collected at the site:

- Priority Pollutant Metals and Barium;
- Nitrate and Nitrite; and
- Nitroaromatic and Nitramine explosives (including PETN and Ammonium Picrate/Picramic Acid (AP/PA)).

As part of this investigation, surface water sample collection was recommended near the landfill to determine whether constituents of concern are migrating from this area to Lacamas Creek.

2.3 Site Surface Water Hydrogeology

Lacamas Creek, which begins at the confluence of the North and East Forks, flows through the Camp Bonneville site. The creek is fed by David Creek and Buck Creek, which drain the southeast part of the site. Lacamas Creek exits the

southwest corner of the site, ultimately connecting to the Columbia River near Camas, Washington.

In most areas, the creek cuts through Quaternary floodplain and stream channel alluvium and lacustrine deposits. These deposits are comprised mainly of clay, silt, and sand, with some gravel. Recharge to Lacamas Creek could occur through groundwater migration through this alluvium as well as precipitation and surface runoff.

Soils underlying the landfill area consist of approximately 20 feet of reddish brown silt and clay underlain with depth by silty sandy gravel, silt, and clay. Groundwater is present under the landfill at depths ranging from 10 to 25 feet below ground surface and appears to drain to the west.

According to the October 8, 1999, site visit conducted by Hart Crowser and the Corps representative, the Landfill 4 site sits on a hill that slopes downward toward the North Fork of Lacamas Creek. No evidence of seeps were observed along this slope. At this area, selected sample locations within The North Fork and its tributaries are within shallow flowing water.

2.4 Description of Field Investigation

Hart Crowser will collect three surface water samples (HC-SW01 through HC-SW03) from the sampling locations shown on Figure 2. The actual locations of these samples will be confirmed at the time of field sampling. Sampling and analysis methods are discussed further in the Field Sampling Plan. The samples and one field duplicate will be submitted to the analytical laboratory for analysis of the constituents of concern listed in Section 3.0.

2.5 Cultural Resources

It is not likely that human remains will be encountered during investigations. However, if encountered, Hart Crowser will immediately cease all work and notify the Corps of the find and leave all materials intact. Hart Crowser will notify the Contracting Officer Representative (COR) within four hours of the find, and the COR will contact the Clark County Sheriff's Department to ascertain whether the remains are of recent and potentially criminal origin. The COR will also contact the Fort Lewis Public Works Archaeologist for consultation about the nature and disposition of the remains, should the Sheriff's Department determine that the remains are associated with Native American burial practices. Hart Crowser will redirect work to other areas until the disposition of the find is arranged to the satisfaction of the appropriate Native American group. Disposition will take place as rapidly as possible (within 30 days of the find), and

in conformity with the Native American Graves Protection and Repatriation Act, Section 3(d).

Hart Crowser will immediately cease all work and will notify the COR within 4 hours in the event that: evidence of prehistoric occupation (non-sawed bone fragments, charcoal, fire-modified rock or cryptocrystalline flaking debris) is encountered in a place where no prehistoric archaeological site has been identified; or concentrated historic debris in excess of 50 years of age is encountered where no historic site has been identified. The COR will contact the Fort Lewis Public Works Archaeologist for consultation about the nature and disposition of the remains. The Corps will arrange for an on-site inspection by cultural resource specialists (archaeologists and Native American Tribe cultural specialists) within 24 hours of receiving such notice. A coordinated decision will be made within 30 days of the find.

2.6 Schedule and Reporting

The proposed schedule for the field work is presented in the table below.

Activity	Time of Completion	Date
Submit Draft Work Plan (DWP)	21 days after Notice to proceed	October 20, 1999
Corps comments to DWP	15 days after receipt of DWP	November 5, 1999
Submit Written Responses to DWP	7 days after receipt of comments	November 10, 1999
Corps Approval of Responses	7 days after receipt of responses	November 17, 1999
Submit Final Work Plan (FWP)	7 days after approval of response to comments	November 24, 1999
Corps Approval of FWP	7 days after receipt of FWP	December 1999
Completion of Field Work	Expedited	October 25, 1999
Submit Draft Final Report (DFR)	45 days after completion of field work	December 10, 1999
Corps Comments to DFR	14 days after receipt of DFR	December 24, 1999
Submit Written Responses to DFR	14 days after receipt of comments	January 7, 2000
Corps Approval of Responses	7 days after receipt of responses	January 14, 2000
Submit Final Project Evaluation Report	14 days after approval of responses	January 28, 2000

Field work will be expedited on an accelerated schedule agreed to by the BRAC Cleanup Team to ensure collection of samples during low flow conditions.

After completion of the field investigation and acquisition of chemical data and their data-quality indicators, the data-quality objectives shall be reviewed to ensure that project goals have been met. The project evaluation report will include findings and recommendations for further investigations (if necessary), a site map showing relevant features and sampling locations and analytical

concentrations, a description of field activities and stream conditions, and tables summarizing the analytical results. Twelve hard copies and one electronic copy of each report will be submitted to the Corps, unless otherwise indicated.

3.0 SAMPLING AND ANALYSIS PLAN

This Sampling and Analysis Plan (SAP) describes the field methods that will be used to collect field parameter measurements and surface water samples.

This SAP was prepared in accordance with the Statement of Work (SOW, Corps, 1999), US Army Corps of Engineers Shell (Corps, 1998), and the US Army Corps of Engineers Requirements for the Preparation of Sampling and Analysis Plans (Corps, 1994). The activities described in the SAP will be conducted using Corps-approved laboratory and field quality assurance/quality control (QA/QC) procedures and methods whenever available. Field activities will be performed by Hart Crowser personnel as assisted by UXB International (UXB). UXB will provide unexploded ordnance (UXO) avoidance. Chemical analyses will be performed by Columbia Analytical and Laucks Testing Laboratories.

3.1 Field Sampling Plan

This section presents a summary of the rationale and proposed scope of the site investigation field activities. This includes the procedures and methods to be used to collect field parameter measurements and surface water samples.

3.1.1 UXO Avoidance

Prior to the sampling event, the UXO team will conduct a reconnaissance of the sampling areas. Items encountered during operations that are positively identified as UXO will be reported to the Hart Crowser Field Manager; the Hart Crowser Field Manager will coordinate for the required Explosive Ordnance Disposal (EOD) support through Camp Bonneville. Disposition of these items is the responsibility of U.S. military EOD personnel. UXO avoidance is the primary objective when conducting site inspections and remedial investigations. If anomalies are present at a pre-selected sampling location, a new location will be selected.

Access Clearance. UXO clearance activities will focus on locating areas that are free of UXO for sampling. Using a Foerster Ferex (MK26), Schonstedt GA52 or 72 series magnetometer, or equivalent, UXO personnel will locate an access route and investigation site that are free of surface and subsurface UXO. If an anomaly is located, the access route and/or site will be diverted around the

anomaly. The boundary of each cleared site and access route will be marked using white survey flagging or pin flags. Individual ordnance items and/or near-surface anomaly locations will also be prominently identified with red and yellow survey flagging or pin flags, respectively. The cleared access routes will be wide enough for the sampling crews, vehicles, and equipment to safely approach the investigation site. At minimum, access routes will be a width equal to twice the width of the widest vehicle anticipated to traverse the access path.

Instrument Calibration. Prior to use in the field each day, geophysical instrumentation will be checked for operational reliability and calibration prior to use in the field. This daily check is the responsibility of the UXO Team Leader and will be done against a known, buried item. Copies of instrument check-out and calibration verification will be maintained on site.

If equipment field-checks indicate that a piece of equipment is operating incorrectly and field repair cannot be made, the equipment will be immediately tagged and removed from service. Replacement equipment will meet the same specifications for accuracy and sensitivity as the equipment removed from service.

3.1.2 Sampling Methods for Surface Water

Surface water samples will be collected at each location as presented on Figure 2. A summary of samples to be collected is presented in Table 2. Sampling will be conducted on upstream samples first to minimize potential contamination issues.

Surface water samples will be collected by procedures that will minimize resuspension of sediment. A minimum length of Teflon tubing will be attached to an unpainted, untreated wood pole. This pole will be lowered into the water column without disturbing bottom sediment. Precleaned sample bottles provided by the laboratory will be directly filled using a low flow (approximately 100 ml/min) peristaltic pump to minimize disturbance of sediment. Sampling containers and preservation techniques are summarized in Table 3. Samples submitted for dissolved metals will be collected using a 0.45 µm in-line filter.

During sampling, we will also measure field parameters at each location and record them in the field notebook. These parameters include: dissolved oxygen, turbidity, temperature, and pH. Equipment and calibration details are provided in the QAPP.

3.1.3 Sample Analysis

The three samples, and one field duplicate will be analyzed for the following:

- Hardness (EPA Method 6010);
- Total Suspended Solids (EPA Method 160.2)
- Nitrate (EPA Method 353.2);
- Nitrate/Nitrite (EPA Method 353.2);
- Total and Dissolved Priority Pollutant Metals and Barium (EPA Method 6020/7470);
- Nitroaromatic and Nitramine explosives including PETN(EPA Method 8330); and
- Ammonium Picrate/Picramic Acid (AP/PA, LTL HPLC).

In addition, one QA sample will be collected with the project samples and blind duplicate and submitted to the Corps QA laboratory. Both the blind duplicate and QA triplicate will be collected at the downstream sample location. Details of analytical methods, including reporting limits and analyte lists, are presented in the QAPP.

3.1.4 Decontamination Procedures and Investigative-Derived Waste Plan

Dedicated tubing will be used for each sample location, so no decontamination procedures are necessary. Sampling gloves will be changed between sample locations. Sample gloves and used tubing will be stored in plastic bags and disposed of as solid waste by Hart Crowser.

3.1.5 Sample Documentation and Handling Procedures

Field Reports. While conducting field work at the site, the Hart Crowser field representative will document pertinent observations and events in a log book and on a daily field report and provide photographic documentation of the sampling effort. The log book will contain a description of each field activity and associated details such as time, date, and field conditions. The log book (a bound notebook) will be made from water-resistant paper with sequentially numbered pages. Entries will be made in ink. The field notebook will be filled out for each day of field work and contain at a minimum the following information:

- Project name and location (contract number);
- Name of the person maintaining the notebook;
- Name of Field Contact;

- Names of other team members on site;
- Names and time of arrival/departure of any visitors to the site;
- Summary of Site Safety Meeting;
- Levels of personal protection:
  - Level of protection originally used;
  - Changes in protection, if required; and
  - Reasons for changes;
- Weather conditions;
- Material sampled and by what method;
- Documentation on samples collected to include:
  - Date and time of collection;
  - Location and depth of collection;
  - Type of sample (grab, composite, etc.);
  - Sample matrix;
  - Analyses required;
  - Sample characteristics (i.e., cloudy water, color, etc.); and
  - Readings taken, if any, to include field instrument readings;
- Sample identification:
  - Sample identification number; and
  - Identification of QC and QA samples;
- On-site measurement instruments and calibration record;
- Unusual circumstances or difficulties;
- Laboratories (or destination of samples):
  - Name, address, phone number, and point of contact for both the project and QA labs;
  - Date and number of coolers sent to each lab and method of shipment; and
  - Airbill number (if not hand delivered);
- Photographs taken (include something for scale when taking the photo, date, time, description, and orientation (i.e., N, S, E, or W); and
- Any deviations from the SAP and reasons for deviations.

The original field notebook will be provided to the Corps in the Project Evaluation Report.

Sample Labeling and Nomenclature. Sample labels will clearly indicate the sample number, date, sampler's initials, parameters to be analyzed, preservative added, if any, and any pertinent comments. Sample nomenclature will consist of the sampler ID (HC), and the sample type (SW for surface water), and location number (HC-SW#). The blind field duplicate will be labeled with a fictitious sample number starting with number 10 (e.g., HC-SW-10). The QA sample will have the same name as the project sample. Trip blanks will have their own numbering sequence, e.g., TB-#.

Chain of Custody Records. After collection, samples will be maintained in Hart Crowser's custody until formally transferred to another party. For purposes of this work, custody will be defined as follows:

- In plain view of the field representatives;
- Inside a cooler which is in plain view of the field representative; or
- Inside any locked space such as a cooler, locker, car, or truck to which the field representative has the only immediately available key(s).

A chain of custody record will be initiated at the time of sampling for each sample collected. The record will be signed by the field representative and others who subsequently hold custody of the sample. Couriers or other professional shipping representatives are not required to sign the chain of custody form; however, shipping receipts will be collected and maintained as part of custody documentation. A copy of the chain of custody with all the appropriate signatures will be kept by Hart Crowser.

Sample Handling. Upon collection, samples will be sealed in a plastic bag to prevent cross contamination. Samples will be placed upright in a cooler in such a way that they do not touch each other during shipment. Approximately 3 inches of inert cushioning material will be placed on the bottom of the cooler. Additionally, cushion material will be placed in the remaining space of the cooler. Paperwork (chain of custody, cooler receipt form, composting instructions) will be placed in a water-proof bag and taped to the inside lid of the cooler. A unique cooler ID number will be assigned to each cooler by field personnel and noted on the accompanying chain of custody form and cooler receipt form.

Samples will be delivered to the analytical laboratory in a custody-sealed cooler. Upon sample receipt, the laboratory will fill out a cooler receipt form to document sample delivery conditions. A designated sample custodian will accept custody of the shipped samples and will verify that the chain of custody form matches the samples received.

Samples for the QA laboratory and samples that cannot be delivered to the laboratory by the field representative will be packaged as described above and shipped according to the following procedures:

- The lid will be secured by taping. The cooler will be wrapped completely with strapping tape at a minimum of two locations. Labels will not be covered with sealing tape;

- The completed shipping label will be attached to the top of the cooler; and
- Signed custody seals will be affixed on the front right and back left of the cooler.

The project and QA laboratories will be notified, two weeks prior to sample collection and again two days prior to arrival of samples, of the approximate number of samples, matrix, and requested analyses. A key to field identification numbers will be provided to the QA laboratory only.

3.2 Quality Assurance Project Plan

The purpose of the Quality Assurance Project Plan (QAPP) is to define, in specific terms, the quality assurance (QA) and quality control (QC) objectives, organization, and functional activities associated with the sampling and analysis of surface water samples obtained during the Camp Bonneville Surface Water Investigation. Details of the QA/QC requirements are presented in the Management Plan (Hart Crowser, 1998).

All analyses for surface water samples will be performed in accordance with the methods specified in Table 4, the SOW (Corps, 1999), and the Corps Methods Compendium (Corps, 1998). Laucks Testing Laboratories (Corps-certified) will perform EPA Method 8330. The remaining analyses will be performed by Columbia Analytical Services of Kelso, Washington. Corps certifications and laboratory SOPs will be provided to the Corps upon request. Addresses and contacts of the project laboratories and the Corps of Engineers quality assurance laboratory are listed below.

Project Laboratories:
Columbia Analytical Services
1317 South 13th Avenue
Kelso, WA 98626
Contact: Richard Craven (360) 577-7222

Laucks Testing Laboratories
940 South Harney Street
Seattle, WA 98108
Contact: Kathy Kreps (206) 767-5060

Corps of Engineers Quality Assurance Laboratory:
420 S 18th Street
Omaha, NE 68102
Contact: Laura Percifield (402) 444-4314
FAX (402) 341-5448

Site-specific reporting limits (SSRLs) presented in Table 4 are typically achieved by the laboratory for the methods defined in the table; however, matrix interferences may result in higher sample quantitation limits. In general, detection limits will reflect the lowest concentration of an analyte that can be accurately and reproducibly detected by the analytical method employed. Data for each target compound generated will be reported with a reporting limit (RL) by the analytical laboratory for this project. The RL is defined as the lowest reproducible concentration at which a chemical can be accurately and reproducibly quantitated for a given sample. The RL can vary from sample to sample depending on sample size, matrix interferences, moisture content, and other sample-specific conditions. Reporting limits usually correspond to the lowest calibration standard.

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4.0 REFERENCES

Corps, 1999. Statement of Work. Contract No. DACA67-98-D-1008, D.O. No. 20. Investigation of Surface Water of Lacamas Creek and Tributaries Camp Bonneville. Vancouver, Washington. September 24, 1999.

Corps, 1994. Requirements for the Preparation of Sampling and Analysis Plans. EM-200-1-3.

Corps, 1998. Shell for Analytical Chemistry Requirements. September 26, 1998.

Hart Crowser, 1998. Final Management Plan, Surface Water Investigation of Lacamas Creek and Tributaries, Camp Bonneville, Vancouver, Washington. October 19, 1998.

Shannon and Wilson, 1999. Landfill 4 Investigation Report, Camp Bonneville, Vancouver, Washington, Contract No. DACA 67-94-D-1014. August 1999.

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Table 1 - Project Roles and Responsibilities

Project Role	Personnel Assignment	Responsibilities
Program Manager	David Winter Hart Crowser (206) 324-9530	Ensure that all work is carried out in accordance with contractual obligations and the Delivery Order statement of work. Assist the Delivery Order Manager as needed with technical decisions and in resolving issues. Final reviewer.
Delivery Order Manager	Kym Anderson Hart Crowser (206) 324-9530	Overall responsibility for execution of the Work Plan. Coordinate with Field Manager and Corps PM as necessary to resolve issues.
Corporate Health and Safety Officer	David Chawes Hart Crowser (206) 324-9530	Overall responsibility for resolving H&S issues (in coordination with DO Manager and Field Coordinator).
Field Manager	TBD Hart Crowser (206) 324-9530	Ensure that explorations are conducted and samples are collected in accordance with project specifications. Coordinate field activities with DO Manager, Hart Crowser field personnel, and exploration subcontractors.
QA Officer, Project Chemist	Shannon Dunn Hart Crowser (206) 324-9530	Laboratory coordination and data quality review to assure analytical methods and data are consistent with project needs and data quality objectives..
UXO Avoidance Officer	Mike Donovan UXB International, Inc (703)724-9600.	Monitors all aspects of UXO-related activities and Ordnance and Explosive characterization and identification.
Laboratory Services	Laucks Testing, Inc. (206) 767-5060	Analysis of water samples.
	Columbia Analytical Services (360) 577-7222	Analysis of water samples.

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Table 2 - Summary of Surface Water Sample Locations and Methods of Analysis

Sample ID	Hardness	TSS	Nitrate	Nitrate/ Nitrite	Total Dissolved Metals	Explosives*
HC-SW-01	X	X	X	X	X	X
HC-SW-02	X	X	X	X	X	X
HC-SW-02 (QA Sample)	X	X	X	X	X	X
HC-SW-10 (Field dup of HC-SW-02)	X	X	X	X	X	X
HC-SW-03	X	X	X	X	X	X

X - Submitted to laboratory
* - Including PETN and AP/PA
MS/MSD to be collected at HC-SW-01

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Table 3 - Analytical Methods, Sample Container, Preservative, and Holding Time Requirements

Chemical Analysis	Sample Container	Preservative (1)	Holding Time
Hardness/Total Metals	1 L P	pH <2 HNO3	
Dissolved Metals	1 L P	pH <2 HNO3	28/180 days (3)
Total Suspended Solids	1 L P		7 days
Nitrate	same as above		48 hours
Nitrate/Nitrite	1 LP	pH<2 H2SO4	28 days
AP/PA	2 x1 L AG		7/40 days (2)
Explosives (4)	2 x 1 L AG		7/40 days (2)

(1) All samples shall be maintained at 4°C.
(2) Holding time until extraction/until analysis.
(3) 28 days for Hg, 180 days for rest.
(4) Including PETN.

Double volume for MS/MSD will be collected at one location.

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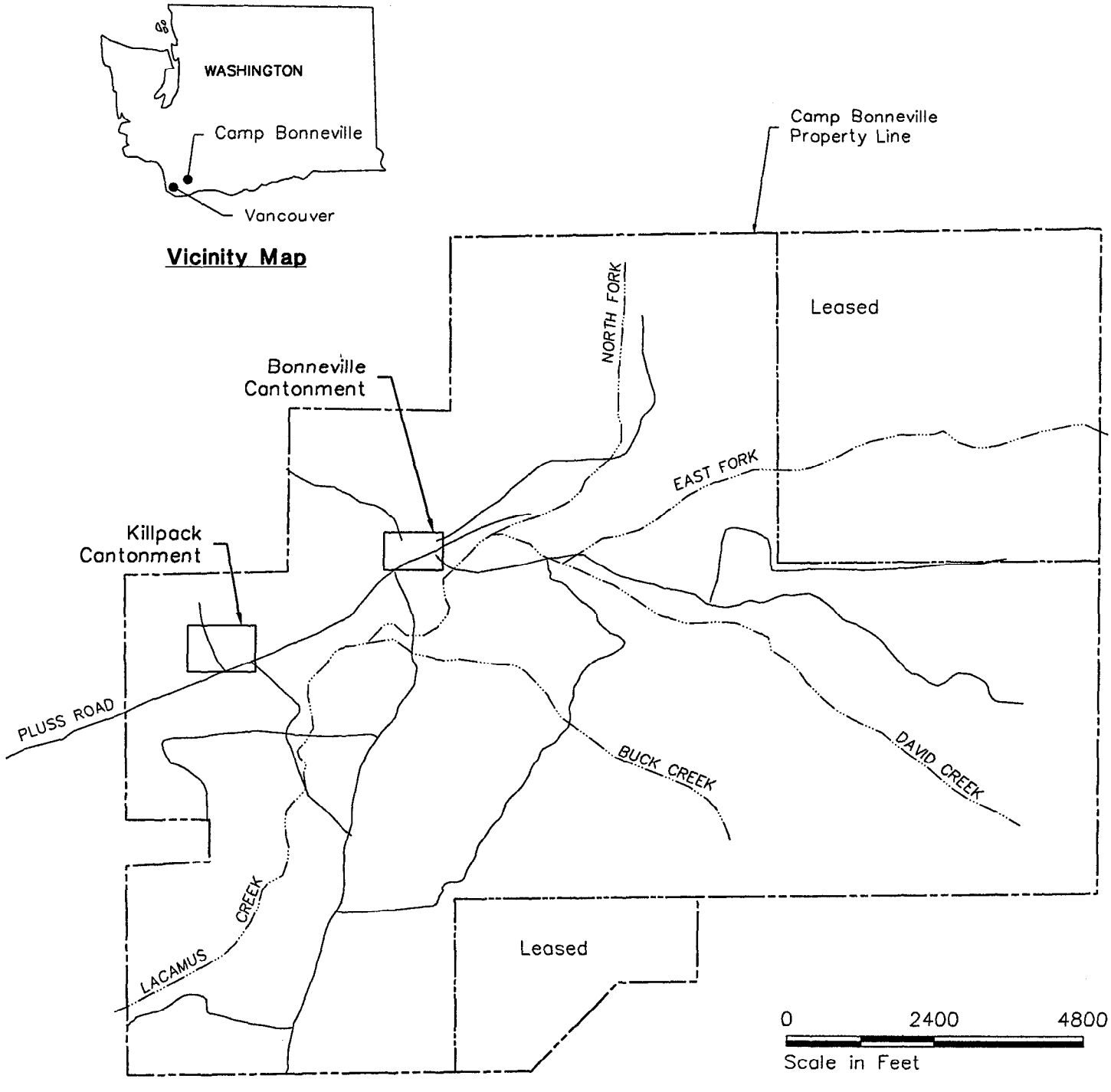
Table 4 - Methods of Analysis and Screening Criteria for Water

Analyte	SSRL	State FW Chronic (1997)	State FW Acute (1997)	CLARC II Method B SW	Analytical Method
Dissolved/Total Metals in ug/L					
Antimony	1	NA	NA	40	EPA Method 6020
Arsenic	0.1	190	360	0.009	EPA Method 6020
Barium	1	NA	NA	NA	EPA Method 6020
Beryllium	1	NA	NA	NA	EPA Method 6020
Cadmium	1	1.03	3.7	20	EPA Method 6020
Chromium	5	10	15	810	EPA Method 6020
Copper	2	11.335	17	NA	EPA Method 6020
Lead	1	2.52 (1)	65	NA	EPA Method 6020
Mercury	*0.2*	0.012	2.1	NA	EPA Method 7470
Nickel	10	157	1415	NA	EPA Method 6020
Selenium	1	5	20	NA	EPA Method 6020
Silver	3	NA	3.45	26000	EPA Method 6020
Thallium	1	NA	NA	NA	EPA Method 6020
Zinc	10	105	114	NA	EPA Method 6020
Total Suspended Solids in mg/L	-	NA	NA	NA	EPA Method 160.2
Hardness in mg/L	-	NA	NA	NA	EPA Method 6010
Nitrate as N in mg/L	0.1	NA	NA	NA	EPA Method 300
Nitrate/Nitrite as N in mg/L	0.01	NA	NA	NA	EPA Method 353.2
Explosives in ug/L					
HMX	0.65	NA	NA	NA	EPA Method 8330
1,3,5 Trinitrobenzene	0.65	NA	NA	NA	EPA Method 8330
RDX	0.65	NA	NA	NA	EPA Method 8330
1,3 Dinitrobenzene	0.65	NA	NA	NA	EPA Method 8330
Nitrobenzene	0.65	NA	NA	449	EPA Method 8330
2,4,6 Trinitrotoluene	0.65	NA	NA	NA	EPA Method 8330
Tetryl	0.65	NA	NA	NA	EPA Method 8330
2,4 Dinitrotoluene	0.65	NA	NA	1360	EPA Method 8330
2,6 Dinitroluene	0.65	NA	NA	NA	EPA Method 8330
2-Am-DNT	0.65	NA	NA	NA	EPA Method 8330
4-Am-DNT	0.65	NA	NA	NA	EPA Method 8330
2-Nitritoluene	0.65	NA	NA	NA	EPA Method 8330
4-Nitrotoluene	0.65	NA	NA	NA	EPA Method 8330
3-Nitrotoluene	0.65	NA	NA	NA	EPA Method 8330
Pentacerythritol tetranitrate	26	NA	NA	NA	EPA Method 8330
Ammonium Picrate/Picric Acid	0.5	NA	NA	NA	LTL HPLC

(1) Assumed hardness - 100 mg/L CaCO3

495620\Bonneville.xls - table4

Site Location Plan



CVD 10/15/99 1=2400 wdstk.pc2
49562000

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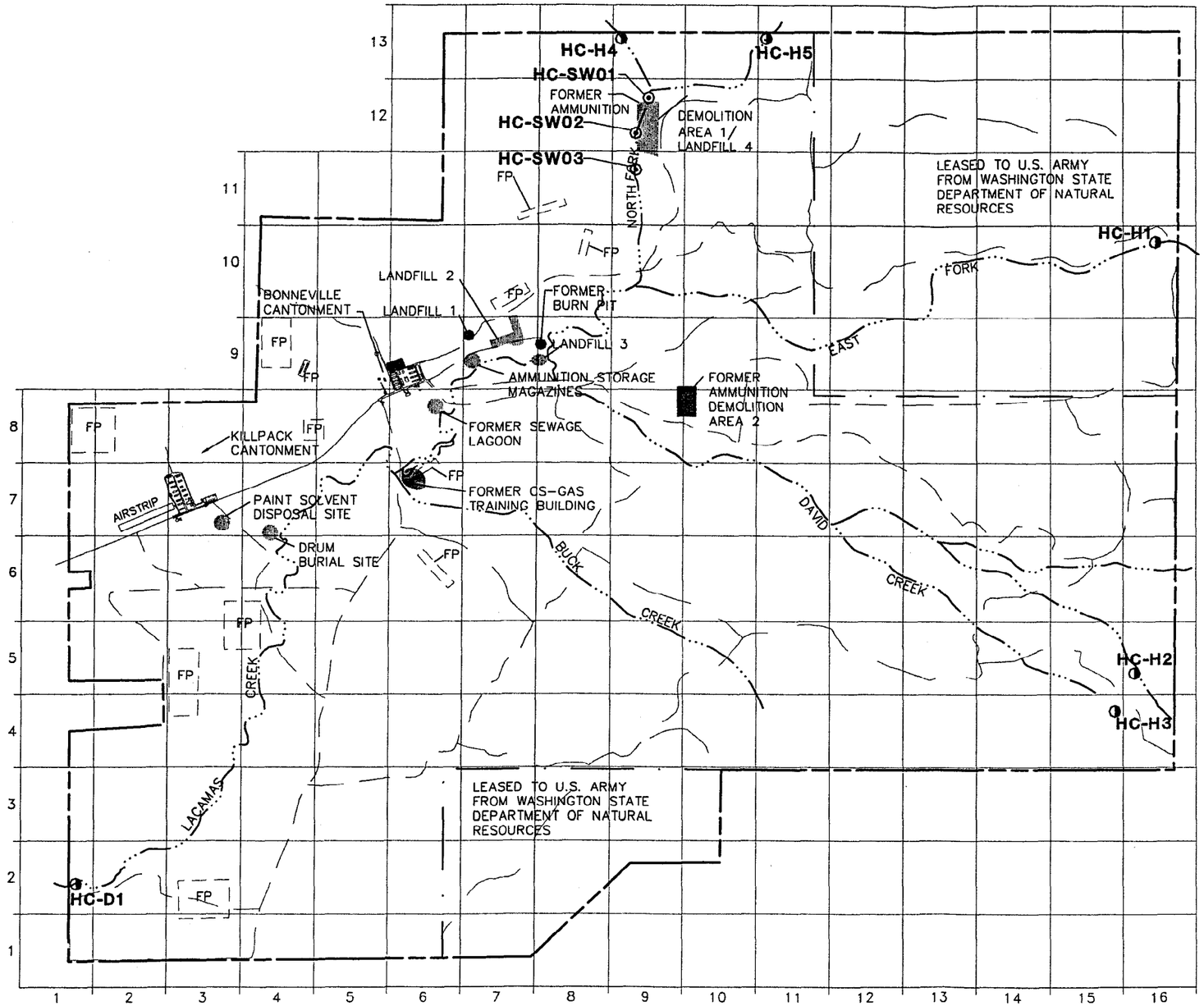
Figure 1

Proposed Surface Water Sampling Location Map



⊙ **HC-SW01**	Proposed Sample Location and Number
◑ **HC-H1**	Previous Sample Location and Number
———	Installation Property Boundary
——— . ———	Leased Areas Boundary
—·····—	Creek

Note: Base map prepared from electronic file provided by Shannon & Wilson, Inc. entitled "cb3.cwg", dated May 1, 1998.

N

0 1000 2000

Scale in Feet

CVD 10/15/99 1=1000 wdsk.pc2
49562001

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Figure 2

www.hartcrowser.com

Anchorage
2550 Denali Street, Suite 705
Anchorage, Alaska 99503-2737
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Tel 907.276.7475

Boston
100 Cummings Center, Suite 331G
Beverly, Massachusetts 01915-6123
Fax 978.921.8164
Tel 978.921.8163

Chicago
333 West Wacker Drive, Suite 700
Chicago, Illinois 60606-1225
Fax 312.750.4507
Tel 312.444.2991

Denver
274 Union Boulevard, Suite 200
Lakewood, Colorado 80228-1835
Fax 303.987.8907
Tel 303.986.6950

Fairbanks
1896 Marika Street, Unit 1
Fairbanks, Alaska 99709-5545
Fax 907.451.6056
Tel 907.451.4496

Jersey City
75 Montgomery Street, Fifth Floor
Jersey City, New Jersey 07302-3726
Fax 201.985.8182
Tel 201.985.8100

Juneau
319 Seward Street, Suite 1
Juneau, Alaska 99801-1173
Fax 907.586.1071
Tel 907.586.6534

Long Beach
One World Trade Center, Suite 2460
Long Beach, California 90831-2460
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